is reached that the definitive chromosomes of the first mitosis constitute two branches which are variously placed with relation to each other. These two branches are the daughter chromosomes of the first mitosis. During the metaphase or anaphase these daughter chromosomes split longitudinally. In the telophase no complete spirem is formed nor do the nuclei reach the resting condition, but the chromosomes preserve their individuality so that the longitudinal portions which appeared in the anaphase of the first mitosis become the daughter chromosomes of the second mitosis. Consequently, the second mitosis cannot be a reduction division. Whether a reduction takes place at the first mitosis will be discussed in the second memoir. In the general résumé the conclusion is reached that in both plants and animals the definitive chromosomes of the first mitosis, at the equatorial plate stage, are composed of two continuous branches. There are two categories of theories as to the significance of the second mitosis, the one holding it as an equation division and the other as a reduction division.

In regard to the two constituent branches of the chromosomes of the first mitosis, there are two possibilities: if they are longitudinal pieces of a segment of a primary chromosome, the heterotypic division is an equation division; if, on the other hand, each of the two branches is a complete somatic chromosome, there is a true reduction in the WEIS MAN sense. The important question is, How are the chromosomes of the first mitosis formed? This will be the subject of the second memoir.

The work will be welcomed by cytologists, for the subject matter is well arranged and conflicting theories are impartially discussed. While the title indicates only a critical review of the literature, the work is something more, because so much botanical investigation has been done in the writer's own laboratory, and because even the zoological section has not been written entirely from the literature, but from the writer's own preparations and numerous preparations loaned by prominent investigators of animal cytology.—CHARLES J. CHAMBERLAIN.

**Nova in hybrids.**—As has been already noted[18] in these pages, TSCHERMAK found a large number of instances in which *nova* appeared in hybrid beans and peas, in very definite ratios which were readily related to the ordinary Mendelian ratio. These *nova* were explained by him as characters latent in one of the parental strains, but rendered patent by the energizing effect of the cross-fertilization. CORRENS has adopted[19] for similar *nova* in Mirabilis the hypothesis of CUENOT, which makes such new characters the result of the combined action of two or more pairs of units, the positive member of some or all but one of these pairs of units being invisible because of the absence of the other member of the combination. For example, an albino mouse bred with a brown mouse may produce black offspring, because the albino contains a unit which

[18] See BOT. GAZETTE **39**:302. Apr. 1905.

[19] See BOT. GAZETTE **40**:234. Sept. 1905.

has the power of changing the gray pigment to black, but this pigment-changing unit will remain invisible so long as the albino is bred only with other albinos.

Under this conception the *novum* is a compound character formed by the combination of equivalent units, instead of a hitherto inactive character rendered active by the stimulating effect of a foreign plasma. TSCHERMAK[20] now assents to the explanation of CUENOT and CORRENS as valid in certain cases, but still maintains that the *nova* of his *Pisum arvense* × *sativum* crosses and others cannot be so explained, because he found no cases in which the offspring were not *all* cryptomeric. TSCHERMAK's reference to the fact that the *nova* are frequently of atavistic nature, as lending support to GALTON's "law of natural inheritance," will scarcely be approved, since the explanation of CUENOT and CORRENS would bring these into agreement with typical Mendelian hybrids.

BATESON[21] has likewise adopted the explanation of CUENOT and CORRENS in the interpretation of *nova* in sweet peas and stocks which had been presented[22] in the Second Report to the Evolution Committee, as wholly out of harmony with Mendelian inheritance. These now constitute exceptionally good examples of characters which can only become manifest when two or more units act together. The statement is made that most of the five gametically distinct types which should appear among the white sweet peas and white stocks of these crosses have been recognized, thus answering satisfactorily, in respect to these two species, TSCHERMAK's contention that the extracted whites were still cryptomeric.

The same explanation is clearly valid for the case reported by CASTLE[23] in which a white guinea-pig crossed with red gave rise to some black offspring, while the "extracted" whites from this cross, when crossed with red, produced no black young.—GEORGE H. SHULL.

**Welwitschia.**—The full paper on *Welwitschia mirabilis* by PEARSON has now appeared,[24] the abstract of last November having been noted in this journal.[25] The region of this strange plant is so difficult of access that Professor PEARSON is to be commended for the unusual efforts he has put forth to secure material. As it happened, the war in Africa has seriously interfered with his work, so that he was able to secure material of only one day's collecting, but he hopes that when the country becomes more settled he will be able to fill in the gaps.

[20] TSCHERMAK, E., Die Mendelsche Lehre und die Galtonsche Theorie vom Ahnenerbe. Arch. f. Rass. u. Gesells. Biol. **2**:663–672. 1905.

[21] BATESON, W., SAUNDERS, E. R., and PUNNETT, R. C., Further experiments on inheritance in sweet peas and stocks: Preliminary account. Proc. Roy. Soc. London B. **77**:236–238. 1905.

[22] See BOT. GAZETTE **40**:313–314. 1905.

[23] See BOT. GAZETTE **40**: 385. 1905.

[24] PEARSON, H. H. W., Some observations on *Welwitschia mirabilis* Hooker. Phil. Trans. Roy. Soc. London B. **198**:265–304. *pls. 18–22.* 1906.

[25] BOT. GAZETTE **41**:226. 1906.